

What is Claimed is:

1. A method for estimating DC motor coil temperature in a motor driving system in which an output of an inverter is supplied to a DC motor, comprising steps of:

calculating a resistance of the coil of the DC motor by using a motor current and a motor voltage, and

estimating a coil temperature by using resistance-temperature characteristics of the coil.

2. A method for estimating DC motor coil temperature as set forth in claim 1, comprising the step of calculating a resistance of the coil of a DC motor by using a duty difference and a current difference by using a plurality of duties, instead the calculating step.

3. A method for estimating DC motor coil temperature as set forth in claim 1 or claim 2, wherein the motor driving system employs fixed coordinate system and applies a voltage with an electrical angle determined to be a constant angle.

4. A method for estimating DC motor coil temperature as set forth in claim 2, wherein the motor driving system maintains a constant duty for equal to or greater than at least 0.5 seconds.

5. A method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 4, wherein the system detects a motor current by using a shunt resistor, and the calculating step calculates a coil resistance at a carrier frequency lower than that for DC motor driving.

6. A method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 5, wherein the DC motor is provided in an interior of a

casing of a compressor, for driving the compressor.

7. A DC motor control method comprising the steps of:
estimating a coil temperature by using one of the methods of claim 1 to claim 6, and

setting a DC motor temperature to be a predetermined temperature based upon the estimated coil temperature.

8. A DC motor control method comprising the steps of:
estimating a coil temperature by using one of the methods of claim 1 to claim 6, and

setting a time interval till starting of a DC motor based upon the estimated coil temperature.

9. A DC motor control method comprising the steps of:
estimating a coil temperature by using one of the methods of claim 1 to claim 6, and

setting driving and controlling method for a DC motor based upon the estimated coil temperature.

10. A device for estimating DC motor coil temperature comprising;
motor driving system in which an output of an inverter is supplied to a DC motor, wherein the system comprises a coil temperature estimating means which comprise means for calculating a resistance of the coil of the DC motor by using a motor current and a motor voltage, and means for estimating a coil temperature by using the resistance-temperature characteristics of the coil.

11. A device for estimating DC motor coil temperature as set forth in claim 10, wherein the coil temperature estimating means calculate a resistance of the coil of a DC motor by using a duty difference and a current difference by

using a plurality of duties.

12. A device for estimating DC motor coil temperature as set forth in claim 10 or claim 11, wherein the coil temperature estimating means employ fixed coordinate system and apply a voltage with an electrical angle determined to be a constant angle.

13. A device for estimating DC motor coil temperature as set forth in claim 11, wherein the coil temperature estimating means maintain a constant duty for equal to or greater than at least 0.5 seconds.

14. A device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 13, wherein the coil temperature estimating means detect a motor current by using a shunt resistor, and calculate a coil resistance at a carrier frequency lower than that for DC motor driving.

15. A device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 14, wherein the DC motor is provided in an interior of a casing of a compressor, for driving the compressor.

16. A DC motor control device comprising;
means for estimating a coil temperature by using one of the devices of claim 10 to claim 15, and
control means for setting a DC motor temperature to be a predetermined temperature based upon the estimated coil temperature.

17. A DC motor control device comprising;
means for estimating a coil temperature by using one of the devices of claim 10 to claim 15, and
control means for setting a time interval till starting of a DC motor based upon the estimated coil temperature.

18. A DC motor control device comprising;

means for estimating a coil temperature by using one of the devices of claim 10 to claim 15, and

control means for setting driving and controlling method for a DC motor based upon the estimated coil temperature.

19. A method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 6, wherein the calculating step calculates a resistance of a coil by compensating a voltage drop due to transistors and diodes included in an inverter.

20. A method for estimating DC motor coil temperature as set forth in claim 1, further comprising the step of carrying out compensation based upon a resistance value of power wirings when a coil temperature is estimated by using a value obtained through calibration.

21. A method for estimating DC motor coil temperature as set forth in claim 19, further comprising the step of detecting a rotor position of a DC motor, calculating an inductance from the detected rotor position, and compensating a coil temperature calculated from a resistance of a coil, in correspondence with the calculated inductance.

22. A method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 6, wherein the detection of the motor current is carried out at central timing of ON-time or OFF-time.

23. A method for estimating DC motor coil temperature as set forth in one of claim 1 to claim 6, wherein the detection of the motor current is carried out under a condition that a predetermined voltage is output by using a PAM circuitry.

24. A device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 15, wherein the coil temperature estimating means

calculate a resistance of a coil by compensating voltage drops due to transistors and diodes included in an inverter, and estimate a temperature of the coil from the resistance of the coil.

25. A device for estimating DC motor coil temperature as set forth in claim 10, wherein the coil temperature estimating means carry out compensation based upon a resistance value of power wirings when a coil temperature is estimated by using a value obtained through calibration.

26. A device for estimating DC motor coil temperature as set forth in claim 10, wherein the coil temperature estimating means detect a rotor position of a DC motor, calculate an inductance from the detected rotor position, and compensate a coil temperature calculated from a resistance of a coil, in correspondence with the calculated inductance.

27. A device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 15, wherein the coil temperature estimating means detect the motor current at central timing of ON-time or OFF-time.

28. A device for estimating DC motor coil temperature as set forth in one of claim 10 to claim 15, wherein the coil temperature estimating means detect the motor current under a condition that a predetermined voltage is output by using a PAM circuitry.